first are true parasites, the mycelium of which, living on the tissues of the host, frequently kills it; the second are false parasites (saprophytes), deriving their nourishment from vegetable substances in various stages of decomposition. The genus *Polyporus* he considers to belong to the first, *Agaricus* to the second of these classes. The common disease of the mulberry-tree he attributes to *Polyporus mori*, not to *Agaricus melleus*, as suggested by Piccone.—A. Mori discusses the old statement of Gasparrini, recently revived by Licopoli, that beneath the stomata of the leaves are cavities, to which Gasparrini gave the name *cistoma*, which are clothed by a continuation of the cuticle. His observations do not lead him to confirm this statement, but rather to the conclusion that the walls of the cavity beneath the stoma consist of ordinary cellulose.

IN the number of the *Scottish Naturalist* for April is the commencement of a suggestive article by the Rev. A. Milroy on the value of the names of places in indicating the ancient surface-features of the country. He takes as an example the country on the banks of the Tay below Perth, and shows the light that is thrown by the Saxon and Celtic local names, not only on the ethnological history of the district, but also on the changes which have taken place in its physical features.

The American Naturalist, May, contains :—Edward Burgess, the structure and action of a butterfly's trunk.—J. S. Lippincott, the critics of evolution.—E. H. Yarnall, Hall's second Arctic expedition.—O. T. Mason, sketch of North American anthropology in 1879.—The editor's table, on the Academy of Natural Sciences, Philadelphia.—On the proposed exploration of the ruins of Mexico and Central America—Recent literature.—General notes.—Scientific news.

Journal of the Franklin Institute, May.—Naval architecture, by Mr. Haswell.—Table and diagram for determining the diameters of speed cones when connected by an open belt of constant length, by Mr. Klein.—Experiments with a steam cutter, by Mr. Isherwood.—Eye memory, by Mr. Leland.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 13.—"Notice of Further Experimental Researches on the Time Relations of the Excitatory Process in the Ventricle of the Heart of the Frog," by J. Burdon Sanderson, M.D., and F. J. M. Page, B.Sc.

The present paper is a continuation of one previously published by the authors (*Roy. Soc. Proc.*, xxvii. 410). The excitatory state, *i.e.*, the condition produced in any excitable structure, vegetable or animal, by excitation, is characterised (1) by the appearance of electromotive properties in the excited part which did not exist before excitation and cease to exist as soon as its effect is over; (2) by diminished excitability; (3) by the fact that it is propagated from the part first excited to contiguous parts at a rate which is different in different structures and in the same structure at different temperatures. These three conditions are important as being the only characteristics by which the hidden process of excitation constantly reveals itself. By means of the rheotome described by one of the authors, exact measurements have been made of the time relations of the above conditions. The results obtained by Engelmann (*Pflüg. Arch.*, xvii. 68) are then discussed. In forty-seven out of seventy-eight preparations of the ventricle of the frog made by this observer, the leading-off contact nearest the point of excitation became first negative, then positive to the other leading-off contact; in the remaining thirty-one the positive deflection was absent. In the case in which the deflection was of a double character (*Doppelschwankung*), the first phase began 0″·06 after excitation, and rapidly attained its maximum; the reversal of sign took place at 0″·26, and the contacts became equipotential at 0″·5. He estimated the rate of propagation at 50 mm. per second. It will be noticed that these researches of Engelmann refer exclusively to the first half second after excitation, and therefore correspond to what has been termed by the authors of the present paper "the initial phase," and that the "terminal phase" escaped the notice of Engelmann. The method employed in the investigation of the above phenomena, with the aid of the rheotome, is then briefly described. The heart was carefully maintained at a constant temperature by being placed on a lacquered brass box, through which flowed a stream of water at the desired temperature. The following table gives the results obtained in a typical experiment at 10° C., with the ventricle of the frog. The preparation was led off at apex and base, and excited close to the apex. The deflections represent the relative changes of potential at the apex contact. The authors reiterate the statement contained in their previous paper, that the electrical effect of excitation manifests itself in two phases, an initial and a terminal one, which have opposite signs, and further conclude that these two phases are separated by a relatively prolonged state of equipotentiality of the two apex contacts. These statements agree with those of Engelmann as far as they relate to the same period; but as the whole of the phenomena recorded by him belong to the beginning of the first second, the commencement of the period of equipotentiality is regarded by him as the end of the excitatory effect; but to the authors the absence of galvanometric effect during this isoelectrical interval is the expression of the fact that both contacts are in the same degree of excitation. The proof that this period of equipotentiality is one of balanced activities is obtained by subjecting the two led-off surfaces to different temperatures. If the apex be warmed the deflections of the terminal phase are increased, and commence at an earlier period; if the apex be cooled they are diminished. This is illustrated by the following table :—

Time after excitation, at which galvanometric circuit was opened, the period of closure being 0″·1 ...	0″·1	0″·2	0″·3	0″·4	0″·5	0″·6	0″·7	0″·8	0″·9	1″·0
Deflections	−42	−3	0	0	0	0	0	0	0	0
Time after excitation, at which galvanometric circuit was opened, the period of closure being 0″·1 ...	1″·1	1″·2	1″·3	1″·4	1″·5	1″·6	1″·7	1″·8	1″·9	2″·0
Deflections	0	0	0	0	0	+3	+30	+12	+1	0

Time after excitation, at which the galvanometer circuit was closed	0″·2	0″·4	0″·6	0″·8	1″·0	1″·2	1″·4	1″·6	1″·8	2″·0
Preliminary observation before warming	−30	0	0	0	0	+ 5	+23	+20	+ 5	0
Immediately after warming	−24	+17	+30	+71	+95	+99	+63	+ 9	+ 5	0
12 seconds later...	−25	+ 5	+ 2	+ 9	+25	+55	+52	+ 6	+ 2	0
24 seconds later...	−29	0	0	0	+ 6	+14	+50	+ 9	+ 2	0
36 seconds later...	...	0	0	0	+ 2	+ 7	+34	+14	+ 5	0
48 seconds later...	...	0	0	0	0	+ 5	+24	+16	0	0

Slight injuries, such as those produced by an application of a minute quantity of 10 per cent. salt-solution, resemble those effected by slight warming. If the injury is more complete, such as is produced by touching the surface momentarily by a red hot wire, the isoelectrical interval is as it were filled up; large deflections in which the warmed surface appears to be positive being obtained throughout the whole of the excitatory period excepting the first tenth. This is seen in the following table :—

Time after excitation of opening of galvanometer circuit, the period of closure being 0″·18.	0″·2	0″·4	0″·6	0″·8	1″·0	1″·2	1″·4	1″·6	1″·8	2″·0
Deflection	+58·6	+85·3	+82·3	+75·0	+68·3	+62·3	+50·0	+31·8	+21·3	+4·1

As regards the period of diminished excitability, the experiments of Marey ("Physiol. Exp." ii. 1876, 85) are first discussed, some experiments are then given which establish—(1) That the duration of the period of diminished excitability agrees pretty closely with that of electrical activity, and (2) that it is similarly affected by changes of temperature.

The rate of propagation of the excitatory wave in a fresh preparation is about 130 mm. per second.

The facts above stated are consistent with the following theories :—1. Every excited part is negative to every unexcited part so long as the state of excitation lasts. 2. The local duration of the excitatory state, *i.e.* the time it lasts in each structural element, is measured by the time interval between the beginning of the initial and the beginning of the terminal phase of the variation. 3. When both contacts are at the same temperature and in all other respects under the same conditions, the local duration of the excitatory state is the same at both, consequently it begins and ends earlier at the leading off contact first excited than at the other, the initial and terminal differences expressing themselves in the initial and terminal phases of the normal variation. 4. When one contact is warmer than the other the local duration of the excitatory state is less in the warmed than in the unwarmed surface. 5. If the surface near one contact is slightly injured, the local duration at the injured surface is diminished in the same way as when the temperature is increased, but if the injury is of such intensity as to destroy its surface, its most prominent effect is to diminish its electromotive activity.

In an appendix the authors briefly consider the results of slight inequalities produced by mechanical, chemical, or thermal conditions on the potential of the surface of the ventricle in the resting heart, and the influence of temperature on the excitability of the resting heart.

A full account of the experiments, the results of which were communicated to the Society, will be published in the *Journal of Physiology*.

May 27.—"On some Thermal Effects of Electric Currents," by William Henry Preece, General Post Office. Communicated by Prof. Stokes, Sec. R.S.

I have been engaged for some time past in experimenting on the thermal effects of electric currents, but the final results of those experiments are not sufficiently ripe at present to justify my bringing them before the Royal Society. I have, however, obtained one result which I believe to be sufficiently novel to justify a short preliminary note.

The most striking facts elicited by these experiments are:

1. The extreme rapidity with which thin wires acquire and lose their increased temperature.

2. The excessive sensibility to linear expansion which fine wires of high resistance evince.

Now as the rate of heating, and therefore of expansion and contraction, varies very nearly directly as the increment or decrement of the currents when these variations are very small, it occurred to me that if a long wire of small diameter and high resistance were attached to a sounding board or to the centre of a disk (such as one of those used for telephones and phonographs) and it formed part of a circuit conveying telephonic currents, sonorous vibrations ought to be reproduced.

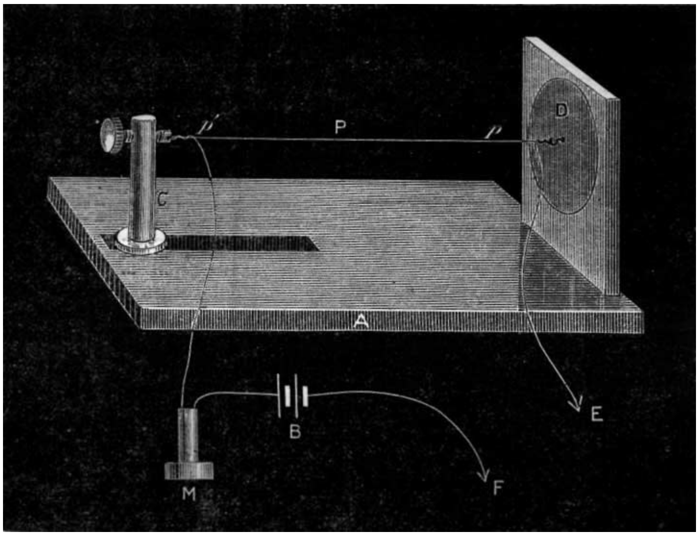
The sketch shows the arrangement of the apparatus used for the experiment.

A was a stout base of mahogany, on which a brass support C was attached so that it could slide and be fixed at any distance from D.

D was at first a disk of thin paper, and then of thin iron.

P was the wire experimented upon whose loose ends were connected to terminals on the wooden base, so as to be inserted in the circuit containing a microphone transmitter M and a battery B of six bichromate of potash cells in another room out of hearing.

A platinum wire of 0·003 inch diameter and 6 inches long from *p* to *p'* was first used, and the sonorous effects were most marked and encouraging when the microphone transmitter M was spoken into. The articulation, though muffled, was clear, and words could easily be heard.



1. Experiments were first made to determine the length which gave the loudest sound and the clearest articulation, and, after repeated trials with every variation of length from 1 inch to 6 feet, it was found that a wire 6 inches long gave the maximum effect.

2. Experiments were then made to determine the diameter of the wire that gave the best effect, and after repeated trials with every gauge drawn from 0·0005 inch to 0·005 inch, it was found that wire of the diameter 0·001 inch gave the best effect.

3. Experiments were then tried with wires 6 inches in length and 0·001 inch diameter of different materials, viz., gold, iron, aluminium, silver, copper, palladium, and platinum, and they came out in the following order of merit:—

Platinum	Very clear.
Aluminium	Very variable.
Palladium	Clear.
Iron	Clear.
Copper	Faint.
Silver	Faint.
Gold	Very poor.

4. The effect of mechanical strain was tried. It was found not to vary the effect. When once the requisite tension, which varied with each metal, was obtained, further tightening up did not vary the clearness or loudness of articulation. Gold would scarcely bear the tension required to reproduce sonorous vibrations, hence its low position.

5. Very thin carbon pencil, ·0625 inch diameter, was tried under compression and under tension, but no effect whatever was experienced unless a bad joint was made, when at once a faint microphonic effect was apparent.

6. No sibilant sounds whatever could be reproduced.

7. That the effect was due to heating and cooling was shown by the fact that it was possible to increase the current to such a strength as to render the temperature of the wire sensible to the touch, and then to make its elongation and contraction by low sounds evident to the eye.

It therefore appears from these experiments that wires conveying those currents of electricity which are required for telephonic purposes expand and contract as they are heated and cooled, and as the variations in the strength of the current are small compared with the strength of the current itself, the expansion and contraction vary in the same ratio as the condensation and rarefaction of the air particles conveying the sonorous vibrations which produced these vibrations.

The mechanical changes, or molecular vibrations in the wire, due directly or indirectly to telephonic currents, which result in the reproduction of sound, bear a close analogy to the mechanical changes due to the direct transmission of sound, but with this important difference, that while the vibrations due to sound are progressive along the wire, and their velocity is low and easily measured, those due to thermal effects are practically instantaneous, and therefore affect simultaneously the whole length of the wire.

NOTE.—De la Rive, in 1843 (*vide* "Electricity," vol. i. p. 304), observed that an iron wire emitted sounds when rapid discontinuous currents were passed through it; but he attributed the effect to magnetism, for he failed to obtain the same effect in non-magnetic wires like platinum or silver.

Graham Bell found, in 1874, that a simple helix without an iron core emitted sounds, and (in 1876) that very distinct sounds proceed from straight pieces of iron, steel, retort carbon, and plumbago, when conveying currents.

Prof. Hughes showed that his microphone was reversible, that is, that it could receive as well as transmit sonorous vibrations.

Mr. Weisendanger (*Telegraphic Journal*, October 1, 1878) reproduced sounds on a microphonic receiver which he called a thermophone, and attributed the effect to its true cause, viz., the expansion of bodies under the influence of heat, which, in fact, is the explanation of all microphone receivers.

Ader reproduced speech by the vibrations of a wire conveying currents of electricity, but he found that only magnetic metals were effective, and therefore, like De la Rive, he attributed the result to magnetic agencies (*vide* Count du Moncel, *Telegraphic Journal*, March 1, 1879).

These and many other sonorous effects of currents on wires may be really due to such heat-effects as I have described.

Chemical Society, May 20.—Prof. H. E. Roscoe, president, in the chair.—The first paper was entitled, "On the Action of Air upon Peaty Water," by Miss Lucy Halcrow and Dr. Frankland. In consequence of the statements of Dr. Tidy in his paper on river-water, as to the rapid oxidation of peaty matter in running water, the authors have studied upon an experimental scale the action of exceptionally strong peaty water upon atmospheric air. The peaty water was exposed to air and light with and without agitation; the organic matter in the water and the oxygen in the inclosed air were determined before and after each experiment. It was found that minute quantities of oxygen were absorbed by the peaty water, but even when some water was shaken for ten and a half hours in a bottle fixed on the connecting-rod of a steam-engine making 100 strokes per minute, only 2½ per cent. of the organic matter was oxidised, assuming that all the oxygen taken up was employed in the oxidation of organic matter. The authors therefore conclude that if peaty matter is oxidised the process takes place with extreme slowness.—Dr. Frankland then read a paper on the spontaneous oxidation of organic matter. This was practically a criticism of the conclusions drawn by Prof. Tidy in his paper alluded to above. The author first referred to the belief so prevalent twelve years ago that water polluted with sewage quickly regains its original purity by spontaneous oxidation, and explained how this belief was upset by the quantitative evidence obtained by the Second Rivers Pollution Commissioners in 1868. He then criticised the results of Prof. Tidy, and pointed out some grave inconsistencies therein. Thus the Shannon, after flowing twenty-three miles through Loch Derg, has its organic elements diminished about 18 per cent., whilst the next flow of a mile effects a diminution of 38 per cent. A sample taken four miles lower down showed an increase of 75 per cent., &c. These inconsistencies could only be explained by want of care in taking and securing an average sample of the river at the different points. The artificial purification of mixtures of sewage and water effected by Prof. Tidy by running water through a series of shallow troughs was then considered, and the chief cause of the diminution of organic carbon and nitrogen attributed to the decomposition of the urea into ammonium carbonate. The author concludes that there is no evidence whatever of the destruction by oxidation of the dead organic matter of sewage by a flow of a dozen miles or so in a river, still less is there any ground for assuming that the organised or living matter of sewage is destroyed under like circumstances. The paper concludes with some statistics as to the effect of the water-supply on the spread of epidemics of cholera, &c. Prof. Huxley pointed out that all diseases which are caused by so-called germs are caused by bodies of the nature of bacteria, and that these organisms were plants, and were therefore extremely unlikely to be oxidised or destroyed by endosmose, as suggested by Prof. Tidy, and that it was quite conceivable that a water containing such bodies might be perfectly pure from a chemical point of view, and yet be as deadly as prussic acid. Prof. Tidy, in reply, pointed to the statistics of the last ten years, which proved that many towns which derived their water-supply from river-water which had been polluted with sewage were as free from fever, &c., as other towns supplied by deep-well water.

Physical Society, May 22.—The annual holiday meeting of this Society was held at Cambridge. On arrival there the party partook of luncheon in a hall of St. John's College, which had been kindly arranged for the purpose by the College authorities. Prof. W. G. Adams occupied the chair, and Mr. Warren De la Rue proposed a vote of thanks to the Master and Senior Fellows of the College for providing the hall. The vote was heartily accorded by the members, and after some remarks from Prof. Adams the party proceeded to the Cavendish Laboratory, where Lord Rayleigh, as vice-president of the Society, presided. The routine business of the meeting being waived, Lord Rayleigh described a plan for limiting the slit of a telescope so as to alter the angular interval with which it can deal. The interval is measured by means of a grating formed by winding a fine wire round two parallel screws of very fine thread.—Mr. Shaw exhibited a modification of Veinholdt's apparatus for distilling mercury, by which a kilogram of mercury can be distilled per hour.—Mr. Sydney Taylor exhibited a device for showing the motion of the particles of water in the transmission of a surface-wave. Sixteen disks were arranged in single file, each having a white spot on its face, and on turning a handle the disks rotated so that the spots, which represented particles of water, moved so as to present a wave-motion to the eye. Mr. Taylor also showed a manometric flame apparatus for exhibiting to the eye the difference of phase between two musical notes. This consisted in two bent tubes, into which the notes were sounded, and capable of being lengthened or shortened by hand like the pipes of a trombone. Opposite the ends of each of these tubes a sensitive flame was placed, and a rotating mirror showed the disturbance produced in the flames by the two different notes. A third flame exhibited the joint effect of the two notes. When the tubes were silent, the images of the flames on the revolving mirror were seen as plane bands; but when notes were sounded into the tubes they became serrated, and the serrations were like or unlike according as the phases of the notes were like or unlike.—Mr. Poynting exhibited a plan for altering the plane of polarisation of the two halves of a pencil of rays from the polariser, so that half the field may be made to appear dark when the other is bright, or both of equal brightness, at will.—Mr. Glazebrook described a method of measuring the rotation of the plane of polarisation of light by means of two spectra giving dark lines made to coincide.—Lord Rayleigh described a plan for demonstrating that yellow colour can be formed by combining red and blue together. He mixes a red solution of chromate of potash with a blue solution of litmus, and on pouring it into a glass cell of a certain thickness, the light transmitted through it is seen to be yellow. Plates of glass coated with gelatin impregnated with litmus and gelatin impregnated with chromate of potash and placed side by side also transmit yellow light. Lord Rayleigh finds, however, that the eyes of different persons vary considerably in their power of appreciating the tinge of the transmitted yellow, one deeming it greenish, another reddish, while a third considers it pure yellow. This peculiarity is not to be confounded with "colour-blindness," since all three persons would distinguish the red and green components accurately. Lord Rayleigh also exhibited a colour-box based on the Newtonian principle, first carried out by the late Prof. Clerk Maxwell, but of a small size.—Sir W. Thomson then proposed a vote of thanks to Lord Rayleigh, which was seconded by Prof. W. G. Adams, and the meeting then dispersed to examine the apparatus and appointments of the Cavendish Laboratory.

Meteorological Society, May 19.—Mr. G. J. Symons, F.R.S., president, in the chair.—Messrs. T. H. Edmonds, F. Ekless, A. H. Taylor, and T. Turner were elected Fellows of the Society.—The following papers were read:—Variations in the barometric weight of the lower atmospheric strata in India, by Prof. E. Douglas Archibald, M.A., F.M.S.—A sketch of the winds and weather experienced in the North Atlantic between lats. 30° and 50° during February and March, 1880, by Charles Harding, F.M.S. The period embraced in this paper includes the time during which H.M.S. *Atalanta* was on her homeward passage, as she left Bermuda on January 31. From the data collected it is shown that a gale blew in the Atlantic every day throughout the two months, excepting on February 21 and 24 to 27. With especial reference to H.M.S. *Atalanta* it appears probable that she would not have met with any exceptionally severe weather earlier than about February 12 or 13, and allowing that she had averaged from five to six knots per hour on her homeward course, she would at that date have inevitably encountered a severe hurricane. A heavy gale is noted on the 12th in 38° N. and 45° W., which is in the direct homeward-bound track from Bermuda, and if the *Atalanta* had only averaged four knots per hour on her homeward course she would have fallen in with this gale. The storm of the 12th and 13th may fairly be considered as about the most severe during the two months here dealt with. It may be remarked that the Norwegian barque *Caspaei* was north of Bermuda on the 3rd, and was in the full force of the gale on the 12th; her distance made shows that the winds were favourable for a homeward passage from Bermuda. The correspondence from H.M.S. *Salamis*, published in the *Times* of May 6, states, on the authority of the captain of the *Caspaei*, "on February 12, in lat. 42° 43′ N., long. 39° 25′ W., while running before the wind, encountered the severest gale he had ever experienced. The ship would not steer, and could not be prevented from broaching to. She was thrown on her beam ends, and remained so for nineteen hours, the cargo of cotton keeping her afloat. Several ships were in sight at the time of the commencement of the gale, and were unable to lay to on account of its suddenness."—On the meteorology of Mozufferpore, Tirhoot, for the year 1879, by Charles N. Pearson, F.M.S.—Mr. D. Winstanley also exhibited his solar radiometer.

Mineralogical Society of Great Britain and Ireland, June 1.—General Meeting.—Prof. T. G. Bonney, F.R.S., vice-president, in the chair.—Messrs. G. Neist Walker, F.G.S., Alex. Murray, F.G.S., director of the Geological Survey of Newfoundland, Geo. S. Mackenzie, Ph.D., and Hjalmar Furuhjelm, Government Inspector of Mines, Helsingfors, were elected as Ordinary Members, and Mr. Robert M. Heddle was elected as an Associate.—The following papers were read and discussed:—On a new face on crystals of stilbite from Scotland and Western Australia, by Prof. M. F. Heddle, F.R.S.E.—On a portable chemical apparatus for quantitative work, by A. E. Arnold.—On kaolinite and kaolin, by J. H. Collins.—On new Scottish minerals, by Prof. Heddle.—Further notes on mineral growth, by T. A. Readwin.—Interesting specimens of minerals were exhibited by Messrs. F. W. Rudler, T. A. Readwin, J. R. Gregory, and Wm. Summers.—The next meeting of the Society will be held at Swansea in August, during the "British Association" week.

PARIS

Academy of Sciences, May 31.—M. Edm. Becquerel in the chair.—The following papers were read:—On an automatic electric lamp, by M. Jamin. A development of the "burner" described before. Three pairs of carbons are set pendant within an oblong covered coil; one pair, having its points nearer than the others, gives rise to the arc first, and burns upwards, and when it is consumed the fusion of a brass wire causes the second pair to come into action (similarly with the third). The expenditure in horse-power and the total light increase up to nine lamps, then both diminish. (Numerical results are fully given.) The brightness of the points directed down is five times that the other way.—On the heat of combustion of the principal hydrocarbonised gases, by M. Berthelot. *Inter alia*, the heat in question is never equal to that of the component elements, and M. Berthelot indicates the nature of the differences.—On the cosmogonic ideas of Kant, *apropos* of a reclamation of priority by M. Schlötel, by M. Faye. He finds no similarity between M. Schlötel's citations from Kant and his own special ideas.—M. Bresse was elected Member in Mechanics in place of the late General Morin.—Synthesis of citric acid, by MM. Grimaux and Adam.—Researches on the albuminoid matters of crystallin as regard the non-identity of those that are soluble with the albumen of white of egg and of serum, by M. Béchamp. In the soluble part he finds two quite distinct albuminous matters (*phacozymase* and *crystalbumin*), and distinctly separates the insoluble matters of the crystallinian fibres from fibrine. He laid special stress on direct analysis and determination of rotatory power, regarding coagulation as of secondary importance.—On the use of volcanic sands in treatment of vines attacked by phylloxera, by M. Novi.—A list of memoirs sent in prize-competition was given.—The Secretary described M. de Candolle's work on "Phytography, or the Art of Describing Plants."—On the refractions of Bessel, by M. Radau.—On an extension to functions of two variables of Riemann's problem relating to hypergeometric functions, by M. Picard.—On a class of two functions doubly periodic, by M. Farkas.—Determination of three axes of a solid body on which centrifugal forces exert, through rotation, a maximum effect, by M. Brassinne.—On the equilibrium of elasticity of a rectangular prism, by M. Mathieu.—Telephone with magnetic superexcitation, by M. Ader. This is based on the principle that if a thin layer of iron or steel be placed before the poles of a magnet it is much more powerfully affected if an iron armature be placed behind than if the latter be not present.—Study of the distribution of light in the spectrum, by MM. Macé and Nicati. Two quantities of light are considered equal when, illuminating a given colourless object placed always at the same distance from the same observer, they enable him to perceive the details with the same distinctness.—On astigmatism, by M. Leroy. Heat liberated in the combustion of some isomeric alcohols of the fatty series, and of œnanthol, by M. Longuinine. Isomerism of substances having the same chemical function, but differing in internal structure, does not appreciably affect their heat of combustion and formation.—On freezing mixtures formed of two crystallised salts, by M. Ditte.—Crystallised hydrofluosilicic hydrate, by M. Kiessler.—Proportion of carbonic acid in the air; reply to M Riset, by M. Marié-Davy.—Preparation of malonic acid, by M. Bourgoin. He has simplified and improved the process.—Preparation of neutral sulphuric ether, by M. Villiers.—Presence in *Soja hispida* (Münch.) of a notable quantity of a substance soluble in alcohol, and easily transformable into glucose, by M. Levallois.—Functions of the swimming bladder of fishes, by M. Marangoni. It rules the migration of fishes. They have to counteract its action with their fins. It produces a double instability, one of level, the other of position.—Researches on the structure of the axis below seminal leaves in cotyledons, by M. Gérard.—Journey from Biskra among the Touaregs, by M. Roche. This gives some geological details.—On the structure and development of the dentinary tissue in the animal series, by M. Magitot.—On the mucus of the cloacal region of the rectum, by MM. Herrmann and Desfosses.—On the inoculability of symptomatic *charbon*, and the characters which differentiate it from splenic blood, by MM. Arloing, Cornevin, and Thomas. The microbe by which the disease is transmitted is quite distinct from the *Bacillus anthracis*.—On M. Rohlfs' journey of exploration into the Eastern Sahara, by M. Berlioux.—French explorations in Central Africa, by M. Fontane. One of the two proposed scientific and hospital stations (the eastern one) is to be established at Kirassa, near Kiora, about 250 km. from Bagamoyo; and Capt. Bloyet, who is to superintend it, has left Marseilles with that object. M. Savorgnan de Brazza has been charged to explore the region about the sources of the Ogooué, and fix a point for the western station; Dr. Ballay accompanies him.—M. Jimenes presented a celestial map projected on the horizon of Mexico.

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